

I Claim:

1. A multiple-fold umbrella comprising:

a central shaft; and

a rib assembly pivotally secured to said central shaft;

said rib assembly including: a top rib pivotally secured to an upper notch formed on a top of said central shaft, a stretcher rib pivotally secured to said top rib and a runner slidably held on said central shaft, an intermediate rib respectively pivotally secured to said stretcher rib and secured to said top rib through an inner connecting rib, a resilient connecting rib slidably coupled to said intermediate rib, and a rear rib respectively pivotally secured to said intermediate rib and said resilient connecting rib through a joint;

the improvement which comprises:

said stretcher rib having a spring device resiliently held in said stretcher rib, said spring device having an inner portion thereof protruding inwardly to said runner to be secured in said stretcher rib or secured to said runner, and having an outer portion of said spring device pivotally connected with said resilient connecting rib; whereby upon opening of the umbrella, the resilient connecting rib has its inner rib portion resiliently cushioned by said spring device in said stretcher rib, and said resilient connecting rib, as retained by said intermediate rib, will be arcuately bent to store its spring energy which will then restore to

bias said joint and to eject said rear rib outwardly to extend the rib assembly linearly for quickly opening the umbrella.

2. A multiple-fold umbrella according to Claim 1, wherein said stretcher rib includes a wide groove formed in an inner or upper portion of said stretcher rib, and a narrow groove portion in an outer or lower portion of said stretcher rib communicated with said wide groove.
3. A multiple-fold umbrella according to Claim 1, wherein said spring device includes: a spring having its inner spring end secured in said stretcher rib adjacent to said runner, and a rod secured to an outer spring end of said spring; said spring slidably held in a wide groove formed in said stretcher rib, and said rod slidably held in a narrow groove portion formed in said stretcher rib and communicated with said wide groove.
4. A multiple-fold umbrella according to Claim 3, wherein said rod has its inner rod end connected with said spring and a free outer rod end adjacent to an outer end of said stretcher rib pivotally connected with the intermediate rib, said rod having a hook portion protruding outwardly from an outer portion of the rod, through a slot notched in said stretcher rib, to be pivotally connected with an inner end of a resilient connecting rib.
5. A multiple-fold umbrella according to Claim 1, wherein said intermediate rib is formed by plastic molding process, and including an inner retainer and an outer retainer respectively

formed on an inner portion and an outer portion of said intermediate rib for limiting said resilient connecting rib within a main groove recessed in said intermediate rib for slidably coupling said resilient connecting rib to said intermediate rib.

6. A multiple-fold umbrella according to Claim 5, wherein said intermediate rib includes said main groove recessed in an inner or lower portion of said intermediate rib, and a shallow groove recessed in an outer or upper portion of said stretcher rib, said inner retainer formed in said main groove adjacent to a stretcher rib and an inner connecting rib, and said outer retainer formed in said main groove adjacent to a joint, with said joint pivotally connecting a rear rib with said resilient connecting rib and said intermediate rib.
7. A multiple-fold umbrella according to Claim 1, wherein said joint includes: a pivotal portion pivotally secured to an outer end of said intermediate rib by a first pivot, and a biasing portion having the rear rib secured therewith and pivotally secured to an outer end of said resilient connecting rib by a second pivot.
8. A multiple-fold umbrella according to Claim 7, wherein said joint is formed as a P shape; and includes a flat edge portion upwardly retained by a retainer plate formed on an upper outer portion of said intermediate rib when opening the umbrella; and a shallow recess formed in said flat edge portion for receiving the outer end of said resilient connecting rib when closing the umbrella.

9. A multiple-fold umbrella according to Claim 8, wherein said resilient connecting rib has its inner and outer rib portions respectively limited by an inner and an outer retainer formed on opposite end portions of said intermediate rib, said outer portion of said resilient connecting rib operatively bent when opening the umbrella to store a spring energy of the outer portion of said resilient connecting rib in order for resiliently biasing said joint to extend said rear rib outwardly for forming a linear rib assembly for quickly opening the umbrella.
10. A multiple-fold umbrella according to Claim 2, wherein said stretcher rib has its wide groove operatively engaged with a top rib and an inner connecting rib when closing the umbrella; and said narrow groove portion of said stretcher rib operatively engaged with a main groove as recessed in said intermediate rib.
11. A multiple-fold umbrella according to Claim 7, wherein said resilient connecting rib defines an axial line L_1 , which is unaligned with a linking line L_2 by linearly linking the first pivot and the second pivot of said joint, whereby upon folding of the rib assembly when closing the umbrella, the outer end of the resilient connecting rib will thrust the biasing portion of the joint counter-clockwise for retracting the rear rib and the rib assembly for closing the umbrella.
12. A multiple-fold umbrella according to Claim 1, wherein said spring device is slidably held in a groove recessed in the stretcher

rib, and includes: a spring having its inner spring end orienting inwardly towards the runner and secured in the stretcher rib and an outer spring end secured to a slide member, with the slide member slidably held in the groove in the stretcher rib and having a hook portion protruding outwardly from said slide member through a slot notched in the stretcher rib to be connected with an inner end of the resilient connecting rib.